

Space Flight Systems Directorate
Activities Report
June 7-19, 2009

ADVANCED FLIGHT PROJECTS OFFICE

ISS and Human Research Project Office

Twenty-two Test Points Performed on SPICE on ISS. The Smoke Point In Co-flow Experiment (SPICE) was operated in the Microgravity Science Glovebox (MSG) facility on board the International Space Station by astronaut Mike Barrett on June 15, 2009. The previous SPICE operations caused soot build up on the output of the experiment assembly, reducing the airflow. Mike ran the Fan Calibration procedure, and a Soot Removal procedure. After completing the Soot Removal procedure, the airflow was restored to nominal and testing could resume on the June 16, 2009. Mike Barrett operated the SPICE experiment and performed eight test points on Tuesday, June 16, 2009, and three test points on Wednesday completing the 50 percent propylene fuel testing. He then completed five test points on ethylene fuel. Mike offered to continue operations and change out to methane fuel. The SPICE team sent up the test matrix for methane fuel, and Mike completed six test points to finish the operations for Wednesday.



**SPICE smoke point image above with 50 percent propylene fuel,
0.4 mm nozzle, June 16, 2009**

The Smoke Point in Co-Flow Experiment (SPICE) is a Microgravity Science Glovebox (MSG) combustion experiment that was launched on Shuttle Flight STS-126/ULF-2. The objective of SPICE is to measure the smoke point of jet diffusion flames in a co-flow environment as a function of nozzle diameter, co-flow velocity, and fuel velocity and fuel composition. Contact: MAH/Robert Hawersaat, (216) 433-8157

Human Research Program

Project Manager Presents Light Microscopy Module (LMM) Capabilities to NIH BioMed-ISS Conference.

DeVon Griffin (Code MAH) attended the National Institute of Health (NIH) BioMed-ISS Pre-Application meeting at the Johnson Space Center (JSC) Gilruth Center on June 16, 2009. The ISS Payloads Office held the meeting to introduce researchers in the bioscience community to the capabilities of ISS hardware that they may wish to use in conjunction with research proposals they will shortly be submitting to the NIH for fundamental biology research to be conducted onboard the ISS.

In addition to attending, Dr. Griffin presented the capabilities of the Light Microscopy Module (LMM) that could support bioscience investigators onboard ISS. Along with John Zoldak of ZIN Technologies, he provided more details during one-on-one meetings held later on in the day. Contact: MAH/DeVon Griffin, (216) 433-8109

Advanced Capabilities Project Office

Propulsion & Cryogenic Advanced Development (PCAD)

PCAD Completes Sea-level Hot-Fires of Aerojet 100-lbf Reaction Control Engine (RCE) in GRC Research Combustion Lab Cell 32 (RCL32). The Aerojet 100-lbf liquid oxygen (LOx) /liquid methane (LCH₄) reaction control engine (RCE) hot-fires in RCL 32 were completed on June 12, 2009. The testing used a Sierra Lobo, Inc. (SLI)-produced Propellant Conditioning Feed System (PCFS) built for the GRC PCAD project. The function of the PCFS was to control propellant temperatures and pressure to the engine over a wide range of operating conditions. The team concluded testing by running pulse testing (nominal three second runs, one-second pulse runs) at warm conditions (224⁰ R oxygen, 224⁰ R methane) and steady-state tests with cold propellants (163⁰R oxygen, 170⁰R methane) with durations of 1-5 seconds. In preparation for continued testing with the PCFS and 100-lbf engines in the Altitude Combustion Stand (ACS), the test team will be pulling a test data review package. Included in this package will be a complete list of lessons learned that will be applied to ACS test configuration, test matrix and test operations. A PCFS performance benchmark test report will be prepared by SLI and GRC. The purpose of this risk-reduction testing is to demonstrate and validate performance levels of liquid oxygen/liquid methane reaction control engines over varying conditions for potential use on the Altair lunar lander descent and ascent stages. (POCs: MAC/Todd Peterson, (216) 433-5350, RPP/Ben Stiegemeier, (216) 433-6270, and FTH/Lynn Arrington (216) 977-7486.

Cryogenic Fluid Management (CFM) Project: Ares V and CFM Discuss Technical Needs and Risks on June 10-11, 2009. An Ares V, Earth Departure Stage (EDS) – CFM project Technical Information Meeting (TIM) was held in Huntsville, Alabama, on June 10-11, 2009. Discussion was held regarding the Ares V technology needs and where the CFM project is supporting them. Currently, several CFM-related EDS analysis tasks are to be completed by August 2009. Additionally, the CFM Project developed risks to EDS that were presented to the EDS team. Follow on risk activities were identified at the “go forward plan” portion of the TIM. Support of customer TIM activities, such as this one for Ares V, is an important aspect of maintaining focus of the CFM project activities on customer needs and ensuring technology infusion at the expected times. Contacts: MAC/Michael Doherty, (216) 433-6641, and RPP/Michael Meyer, (216) 977-7492

Cryogenic Fluid Management (CFM) Project: Successful Preliminary Design Review for Multi-Layer Insulation (MLI) Contract Completed with Ball Aerospace Technologies Corporation (BATC). The CFM Project held a successful Preliminary Design Review with BATC for the Methane Lunar Surface Thermal Control (MLSTC) tank-applied MLI contract. Significant progress has been made in the definition of the MLI closeouts for the tank penetrations. MLI closeouts (socks) on the vent and fill/drain lines will feature multiple layers interleaved with the sub-blankets on the tank with the sock layers being temperature-matched to the penetrations at the warm ends. The MLI closeouts for the remaining penetrations and the three support rods (which have much smaller cross-sections than the vent and fill/drain lines) will not be temperature-matched. NASA authorization to proceed with MLI sub-blanket fabrication was granted. Development and demonstration of

the MLI techniques such as this one will provide valuable data in meeting the lunar surface stay requirements. Contact: MAC/Michael Doherty, (216) 433-6641

SPACE OPERATIONS PROJECT OFFICE

Space Communications and Navigation (SCaN) (Project Manager – Kul B. Bhasin):

The Glenn Research Center Space Network Ground Segment Sustainment (SGSS) lead engineer received training on Space Communications and Navigation (SCaN) Space Network (SN) operations at the NASA White Sands Complex in New Mexico last week.

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